REMARKS

Reconsideration of this application and entry of this Amendment are requested. Claims 16-21, 29 and 32 are active in the application subsequent to entry of this Amendment.

It is proposed to amend the claims in order to more particularly point out and distinctly claim that which applicants regard as their invention. Specifically each of independent claims 16, 29 and 32 and dependent claim 19 are proposed to be amended by employing "consisting essentially of" terminology to exclude the presence of a catalyst support. This is totally unlike the cited prior art (discussed in more detail) which requires the presence of the support.

In item 2 of the Official Action, claims 16-21, 29 and 32 are rejected as allegedly being indefinite, the examiner commenting that these claims "appear to contain use limitations and it is unclear how they limit an iron compound catalyst as claimed". The independent claims recite a property of the catalyst material n,amely that it has a specified catalytic activity which is capable of converting an indicated amount of carbon monoxide to carbon dioxide under the conditions specified. This is, in fact, a limitation of the iron compound catalysts as they must possess this characteristic in order to fall within the claims of the present application.

The "use limitation" urged in item 2 of the Official Action is not an apt description of this portion of the claim. The property of the catalyst is no different than a claim directed to a fiber forming polymer or a protein binding to a specific receptor or site. Indeed, it is not unusual to define compositions with reference to the properties they exhibit. Indeed, such characteristics are regarded as limitations on claims of the type indicated. The claims as currently worded are believed to be apt and compliant with 35 U.S.C. §112, second paragraph. Reconsideration is requested.

The balance of the Official Action relates to a rejection of all claims as either being anticipated by or obvious over the disclosures of U.S. 5,036,032 to Iglesia et al. Applicants submit that their claims differ from the disclosures of this document and, in

fact, are patentable over it in several aspects, not the least of which being the fact that applicants' iron compound catalysts do not include a support.

Before addressing the comments contained in the Official Action it is important to review the significant aspects of the present claims as well as applicants' contribution to the art. Applicants' claims are directed to iron compound catalysts for inhibiting the generation of dioxin. These catalysts consist essentially of: iron oxide particles, iron oxide hydroxide particles or mixture of the two and have the catalytic activity capable of converting carbon monoxide into carbon dioxide under the conditions set out in the claims.

The iron oxide or iron oxide hydroxide particles have an average particle size of 0.01 to 2.0 μm, a BET specific surface area of 0.2 to 200 m^2/g, a phosphorus content of less than or equal to 0.02 % by weight, a sulfur content of less than or equal to 0.1 % by weight and a sodium content of less than or equal to 0.2 % by weight.

In another embodiment, iron compound catalysts for inhibiting the generation of dioxin consisting essentially of aggregates consisting essentially of iron oxide particles, iron oxide hydroxide particles or a mixture of the two and having a specific surface area and average particle size as measured according to the procedure set out in claims 19, 32 and others.

The aggregates/particles have a catalytic activity capable of converting carbon monoxide into carbon dioxide under specified conditions.

These iron oxide or iron oxide hydroxide particles having an average particle size of 0.02 to 1.0 μm, a BET specific surface area of 0.5 to 100 m^2/g, a phosphorus content of less than or equal to 0.005 % by weight, a sulfur content of less than or equal to 0.1 % by weight and a sodium content of less than or equal to 0.2 % by weight.

More concisely stated, the iron compound catalysts of the present invention are characterized by (i) iron oxide particles, iron oxide hydroxide particles or a mixture of the two, or (ii) aggregates consisting essentially of the iron oxide, iron oxide hydroxide particles or their mixture. A support (carrier) is not required in either embodiment. This

feature is emphasized in the amended claims by the use of "consisting essentially of" terminology.

Phosphorus, sulfur and sodium contents of the catalyst are carefully controlled to avoid poisoning the catalyst. Thus it is necessary that phosphorus, sulfur and sodium contents remain within the specified limits or are totally absent.

The iron compound catalysts of the invention enable not only complete combustion of municipal solid wastes but also decomposition of dioxin precursors in an intermittently operated municipal solid wastes incinerator, such as mechanical batch incinerators or semi-continuous incinerators. These catalysts serve to prevent the generation of dioxin due to a memory effect upon low-temperature combustion at start-up or shut-down of an intermittently operated incinerator.

US Patent No. 5,036,032 (Iglesia et al) discloses catalytic metals used for Fischer-Tropsch reactions have been reported as cobalt, ruthenium, iron and nickel (refer to column 4, lines 19 to 21); and that the cobalt metal is supported on a carrier and, generally, inorganic refractory oxides are employed as supports. Preferred supports are silica, magnesia, alumina, silica-alumina, and titania. Supports having an increasing surface area are preferred relative to supports of lower surface area because the higher surface area supports stabilize higher Co dispersions (refer to column 4, lines 38 to 44).

As seen from the above, the coated or rim type catalysts of Iglesia et al are supported cobalt catalysts -- that is, the cobalt metal is supported on a carrier. Further, the catalytic component of the rim type catalysts of Iglesia et al is a metal such as cobalt, ruthenium, iron or nickel.

In addition, the "surface areas range from 50-500m^2/g" in Iglesia et al (column 4, lines 50-51) is a surface area range of the supports – see column 4, lines 38 and 40 "the cobalt metal is supported on a carrier" and "preferred supports are ...". The "diameter of 130Å" mentioned in Iglesia et al is 0.013 μm which is the diameter of the crystallites. Also, the "iron" in Iglesia et al is merely a single line description. The passage referred to relates to catalytic metals for Fischer-Tropsch reactions generally. Iglesia has no

interest in iron – nor nickel or ruthenium metals – and focuses entirely on cobalt throughout the remaining description and the claims.

The iron compound catalysts of the present invention consists essentially of the iron oxide particles and/or iron oxide hydroxide particles having a BET specific surface area of 0.2 to 200 m^2/g, the iron compound catalyst of this invention is different from the catalysts of Iglesia et al. There is no anticipation.

Furthermore, Iglesia et al do not disclose or teach aggregates consisting essentially of iron oxide particles and/or iron oxide hydroxide particles having a specific surface area of not less than 1.0 m^2/cm^3 and an average particle size (D_{50}) of 50 % of a total volume, of up to 8.0 μm as provided by the present invention.

From the single line mention of "iron" of Iglesia et al, one of ordinary skill in the art would not foresee (i) iron compound catalysts for inhibiting the generation of dioxin, consisting essentially of iron oxide particles and/or iron oxide hydroxide particles, or (ii) iron compound catalysts for inhibiting the generation of dioxin, consisting essentially of aggregates consisting essentially of iron oxide particles and/or iron oxide hydroxide particles as defined by applicants' claims.

Accordingly, Claims 16, 29 and 32 define novel and inventive subject matter as do the claims dependent from them.

Entry of this Amendment and allowance are solicited.

Attached hereto is a marked-up version of the changes made to the claim(s) by the current amendment. The attached page(s) is captioned **"Version With Markings To Show Changes Made."**

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____
Arthur R. Crawford
Reg. No. 25,327

ARC:eaw
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

16. (Amended) An iron compound catalyst for inhibiting the generation of dioxin, [comprising] consisting essentially of iron oxide particles, iron oxide hydroxide particles or mixture thereof and having a catalytic activity capable of converting at least 15 % of carbon monoxide into carbon dioxide when 2.8×10^{-4} mol of iron oxide particles obtained by heat-treating said iron compound catalyst in air at a temperature of 800°C for 15 minutes, are instantaneously contacted with 6.1×10^{-7} mol of carbon monoxide at a temperature of 250°C at a space velocity (SV) of 42,400 h^{-1} in an inert gas atmosphere using a pulse catalytic reactor,

said iron oxide particles or said iron oxide hydroxide particles having an average particle size of 0.01 to 2.0 μm, a BET specific surface area of 0.2 to 200 m^2/g, a phosphorus content of less than or equal to 0.02 % by weight, a sulfur content of less than or equal to 0.1 % by weight and a sodium content of less than or equal to 0.2 % by weight.

19. (Amended) An iron compound catalyst for inhibiting generation of dioxin according to claim 16, wherein said iron compound catalyst [comprises] consisting essentially of aggregates [comprising] consisting essentially of said iron oxide particles, said iron oxide hydroxide particles or the mixed particles thereof,

said aggregates having a specific surface area of not less than 1.0 m^2/cm^3 when measured under a feed pressure of 1 bar in a dry granulometer, and an average particle size (D_{50}) of 50 % of a total volume thereof, of up to 8.0 μm.

29. (Amended) An iron compound catalyst for inhibiting the generation of dioxin, [comprising] consisting essentially of aggregates [comprising] consisting essentially of iron oxide particles, iron oxide hydroxide particles or the mixture particles thereof and

having a specific surface area of not less than 1.0 m^2/cm^3 when measured under a feed pressure of 1 bar in a dry granulometer, and an average particle size (D_{50}) of 50 % of a total volume thereof, of up to 8.0 μm, and

a catalytic activity capable of converting at least 15 % of carbon monoxide into carbon dioxide when 2.8 x 10^{-4} mol of iron oxide particles obtained by heat-treating said iron compound catalyst in air at a temperature of 800°C for 15 minutes, are instantaneously contacted with 6.1 x 10^{-7} mol of carbon monoxide at a temperature of 250°C at a space velocity (SV) of 42,400 h^{-1} in an inert gas atmosphere using a pulse catalytic reactor,

said iron oxide particles or said iron oxide hydroxide particles having an average particle size of 0.01 to 2.0 μm, a BET specific surface area of 0.2 to 200 m^2/g, a phosphorus content of less than or equal to 0.02 % by weight, a sulfur content of less than or equal to 0.1 % by weight and a sodium content of less than or equal to 0.2 % by weight.

32. (Amended) An iron compound catalyst for inhibiting the generation of dioxin, consisting essentially of aggregates consisting essentially of iron oxide particles, iron oxide hydroxide particles or the mixture particles thereof and having a specific surface area of not less than 1.2 m^2/cm^3 when measured under a feed pressure of 1 bar in a dry granulometer, and an average particle size (D_{50}) of 50 % of a total volume thereof, of up to 7.0 μm, and

a catalytic activity capable of converting [not] at least 20 % of carbon monoxide into carbon dioxide when 2.8 x 10^{-4} mol of iron oxide particles obtained by heat-treating said iron compound catalyst in air at a temperature of 800°C for 15 minutes, are instantaneously contacted with 6.1 x 10^{-7} mol of carbon monoxide at a temperature of 250°C at a space velocity (SV) of 42,400 h^{-1} in an inert gas atmosphere using a pulse catalytic reactor,

said iron oxide particles or said iron oxide hydroxide particles having an average particle size of 0.02 to 1.0 μm, a BET specific surface area of 0.5 to 100 m^2/g, a phosphorus content of less than or equal to 0.005 % by weight, a sulfur content of less than or equal to 0.1 % by weight and a sodium content of less than or equal to 0.2 % by weight.